

Camo, Hose Clamps, and Pixels:

Arizona's Approach for Low-Cost Intermittent Stream Monitoring

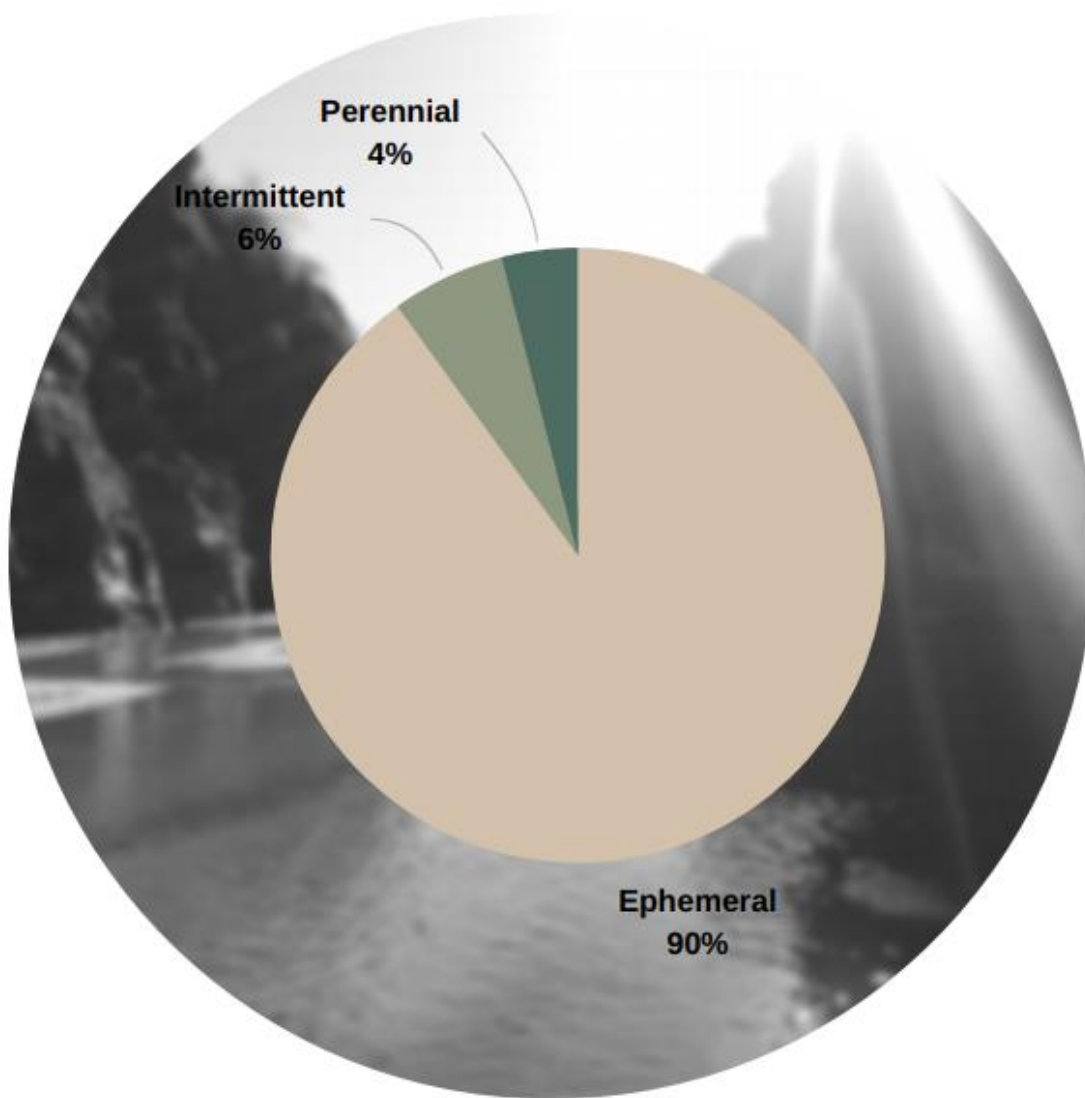
Meghan Smart, Scientist ADEQ

February 21st, 2018




Arizona Has Water!





ARIZONA

STREAMS



Total of 6,000
Intermittent
Stream Miles

Arizona 2016 Assessment

Arizona 2016 Assessment

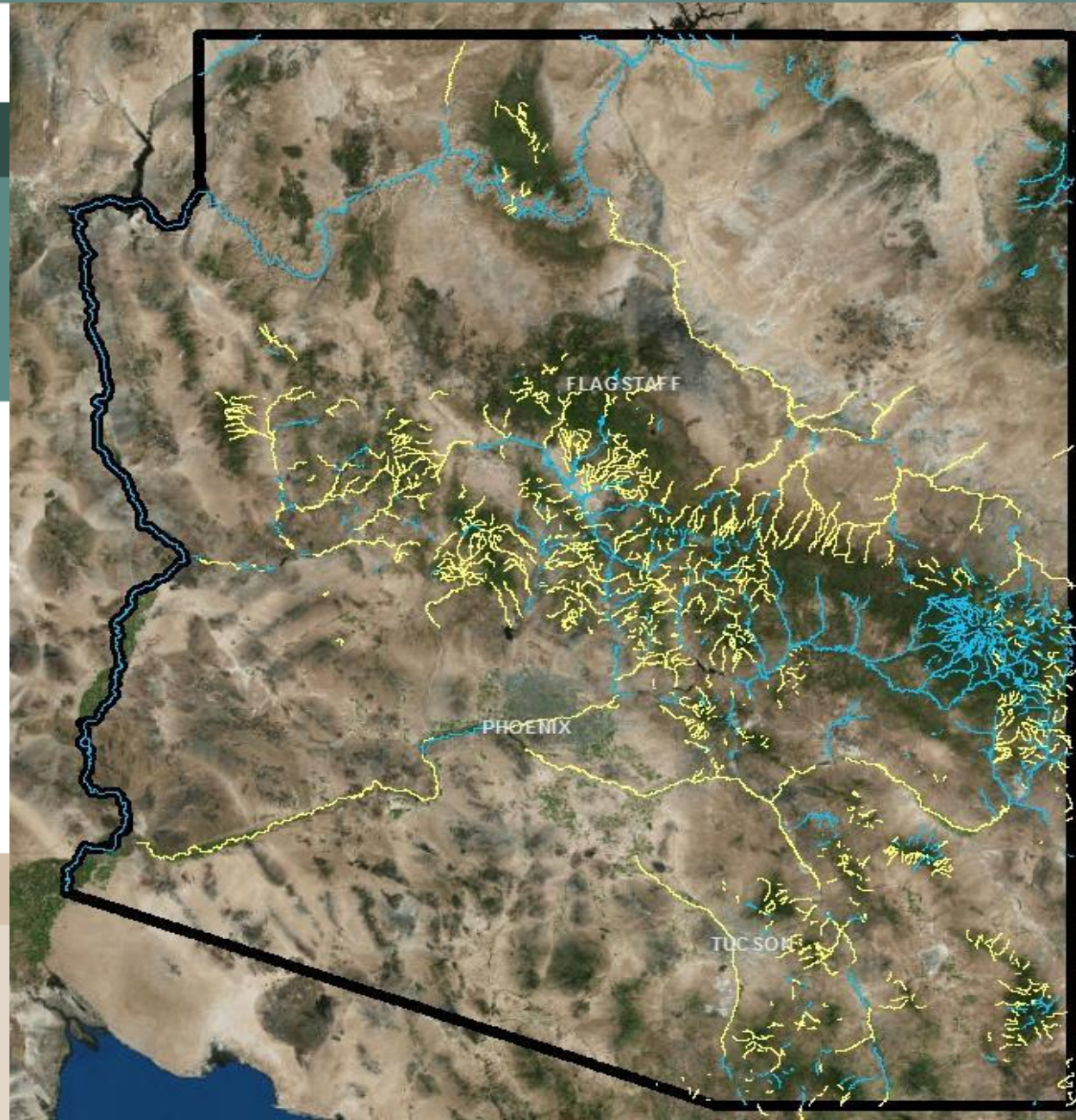
Perennial Streams

Perennial Streams = 40% Assessed



Intermittent Streams

Intermittent Streams = 12% Assessed

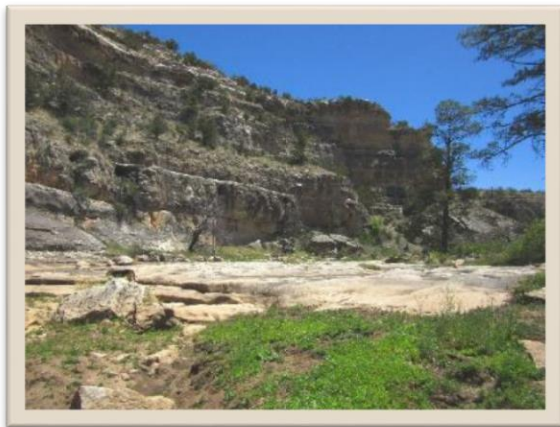


Three Questions

1. HOW ACCURATE IS OUR MAP?
2. WHAT'S THE FLOW CATEGORY: DAYS OF FLOW PER YEAR?
3. WHAT'S THE CONDITION OF INTERMITTENT STREAMS (GOOD, FAIR, POOR)?

Ephemeral ←————→ Perennial

?

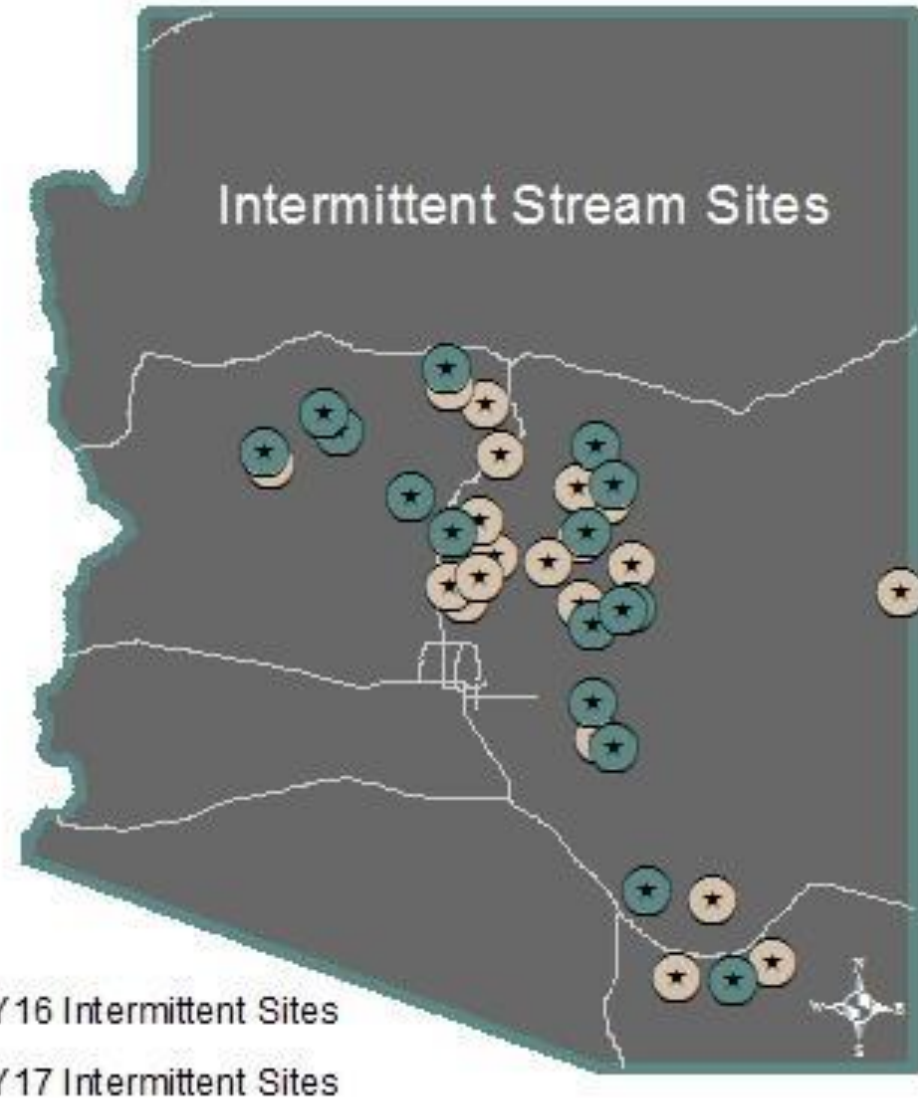


PROBABILISTIC SURVEY

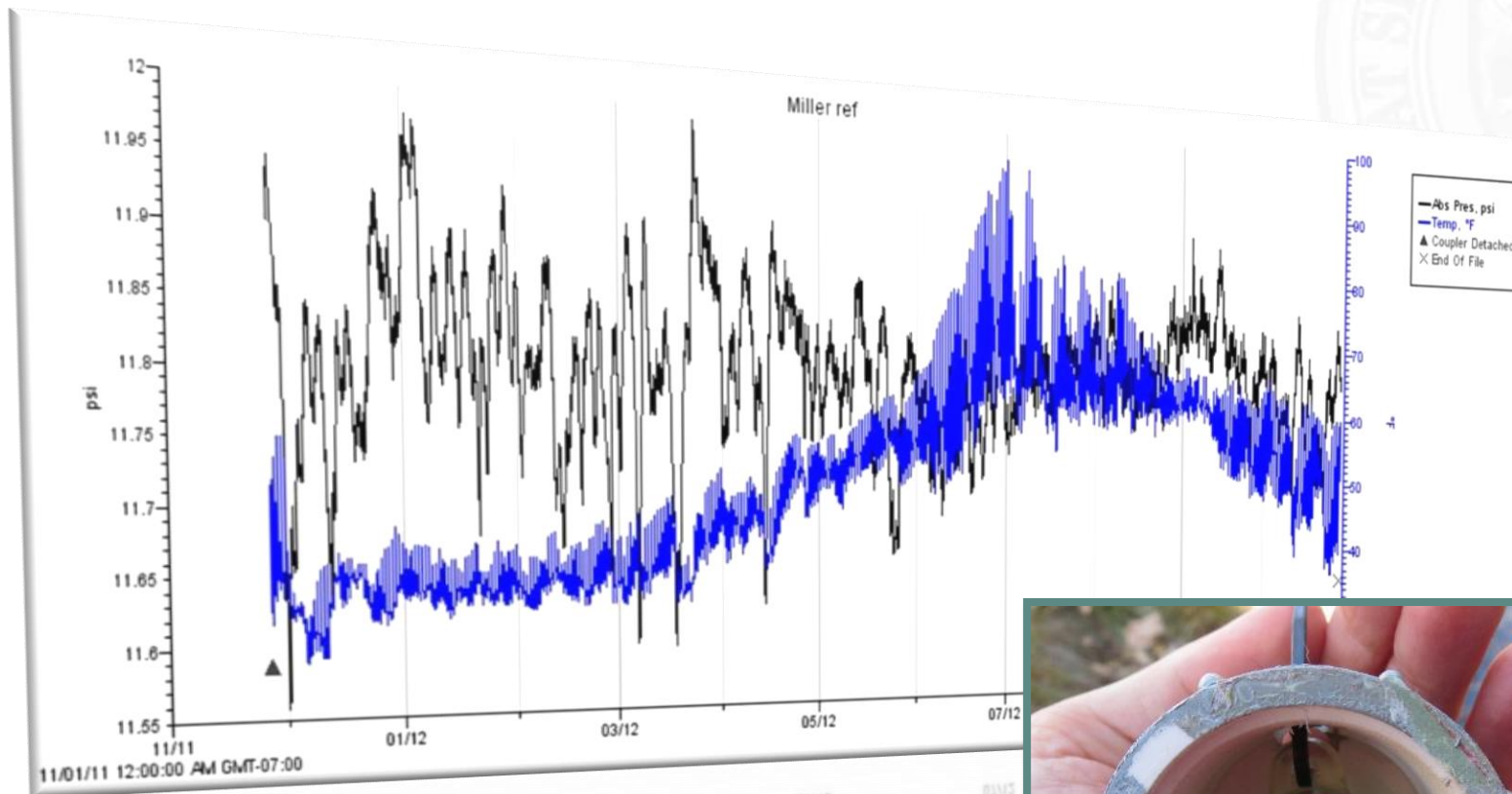
- GOAL OF 40 SITES
- 2 YEAR STUDY

Data:

- ☑ Chemistry
- ☑ Habitat
- ☑ Macroinvertebrates
- ? Flow Category Data
(# days/ Year)



Is It Wet?



Is It Wet?



ITCS00 S014\TS\04 16:20:17

Camera Set-up



Light weight solar panel



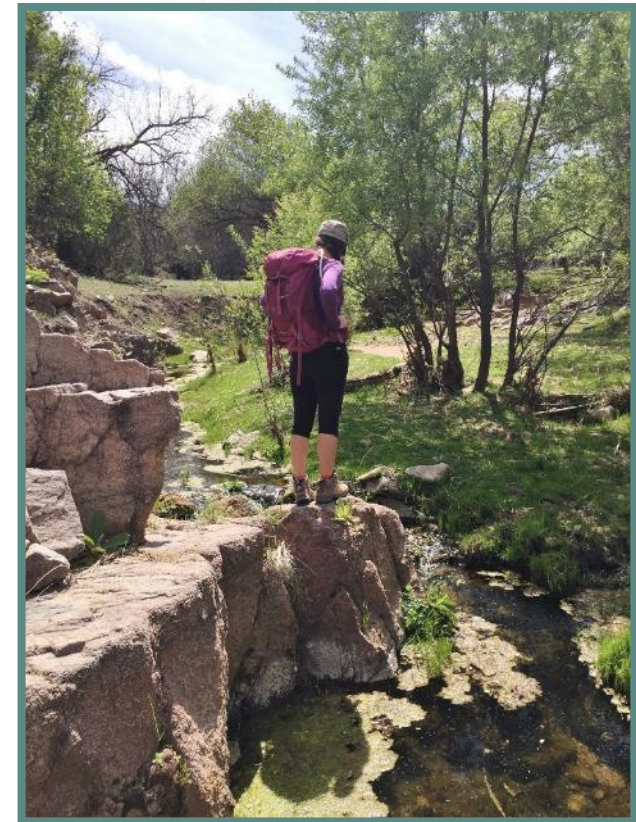
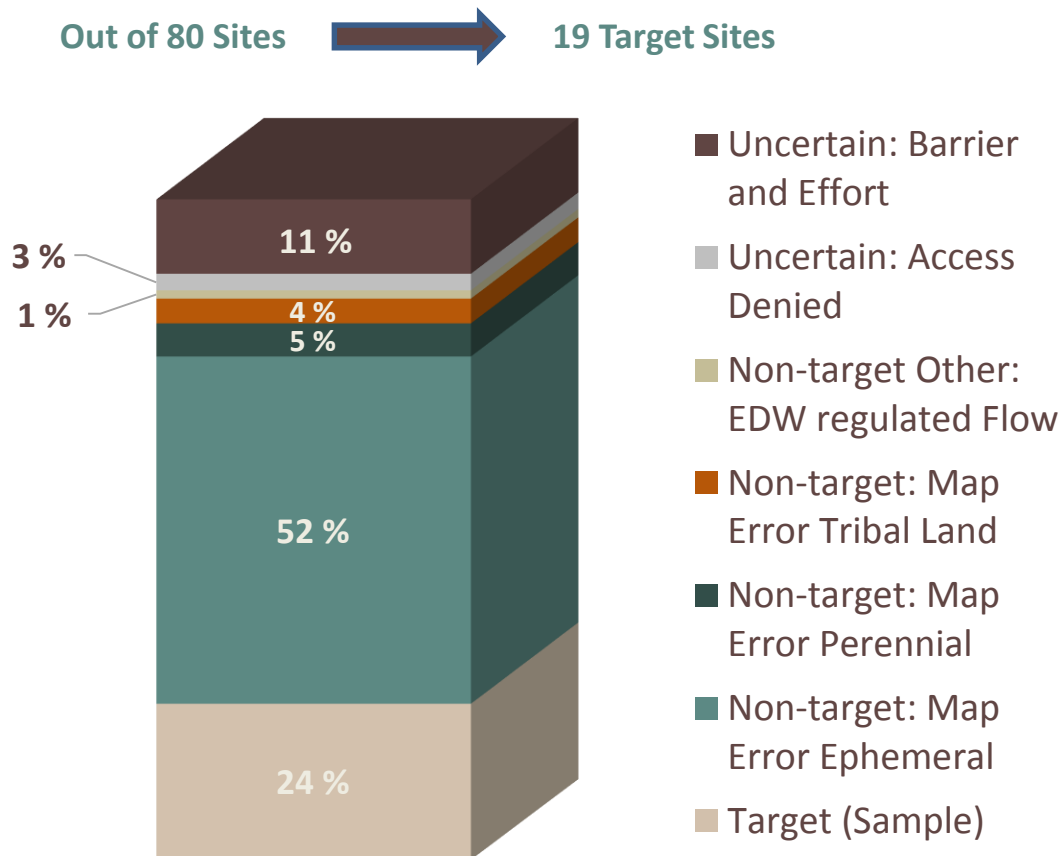
M-550 Moultrie trail camera



12 v Battery with regulator

Total Cost= \$330.00

Probabilistic survey design: great for stats, hard on time!



Hydrologic Indicators



Vegetation



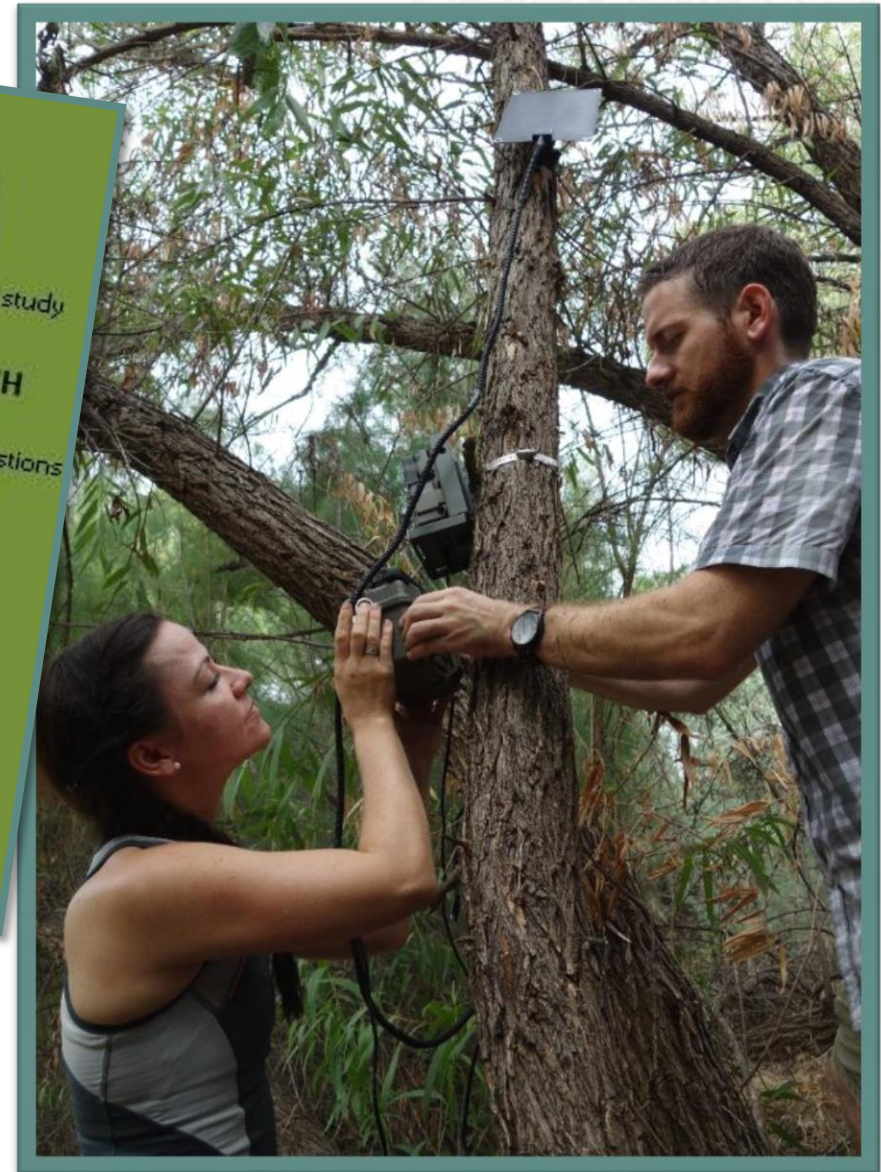
Water



Soil

Installation

- Above bankfull
- Guess where water will be
- Face camera upstream
- Capture multiple habitats
- Test Shots
- Camo
- Positive information tag



Salome Creek Example



What is going on?

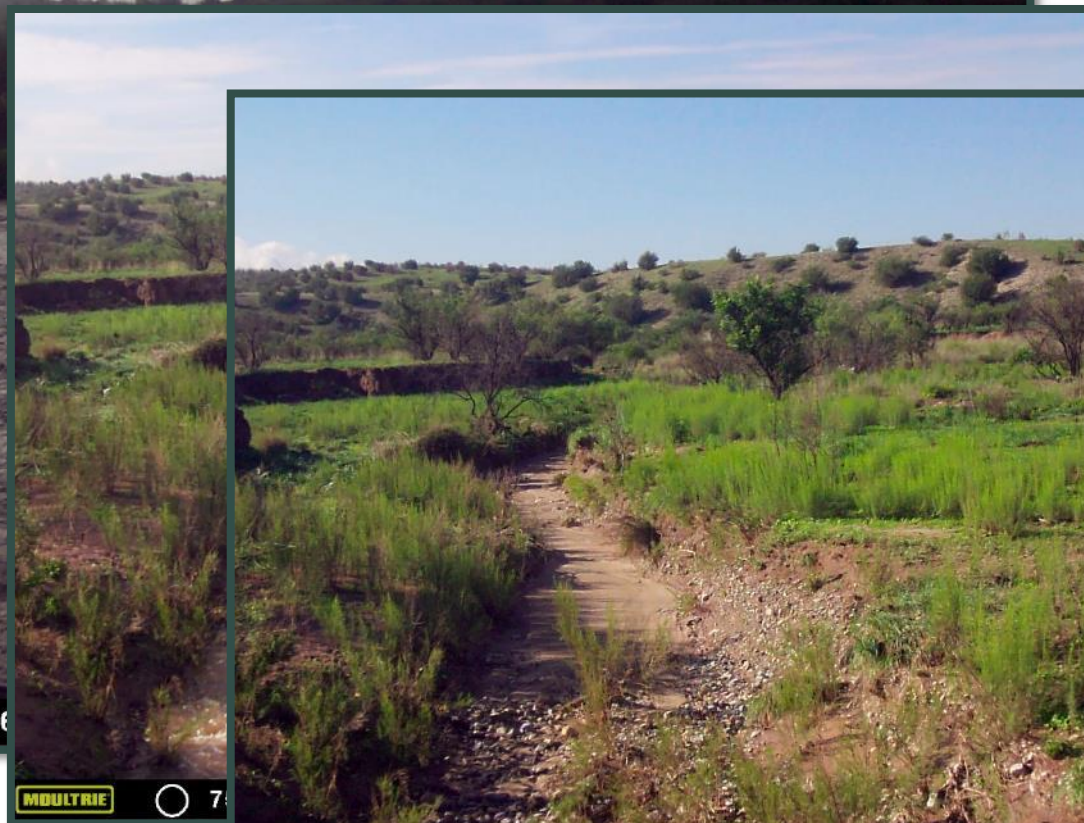
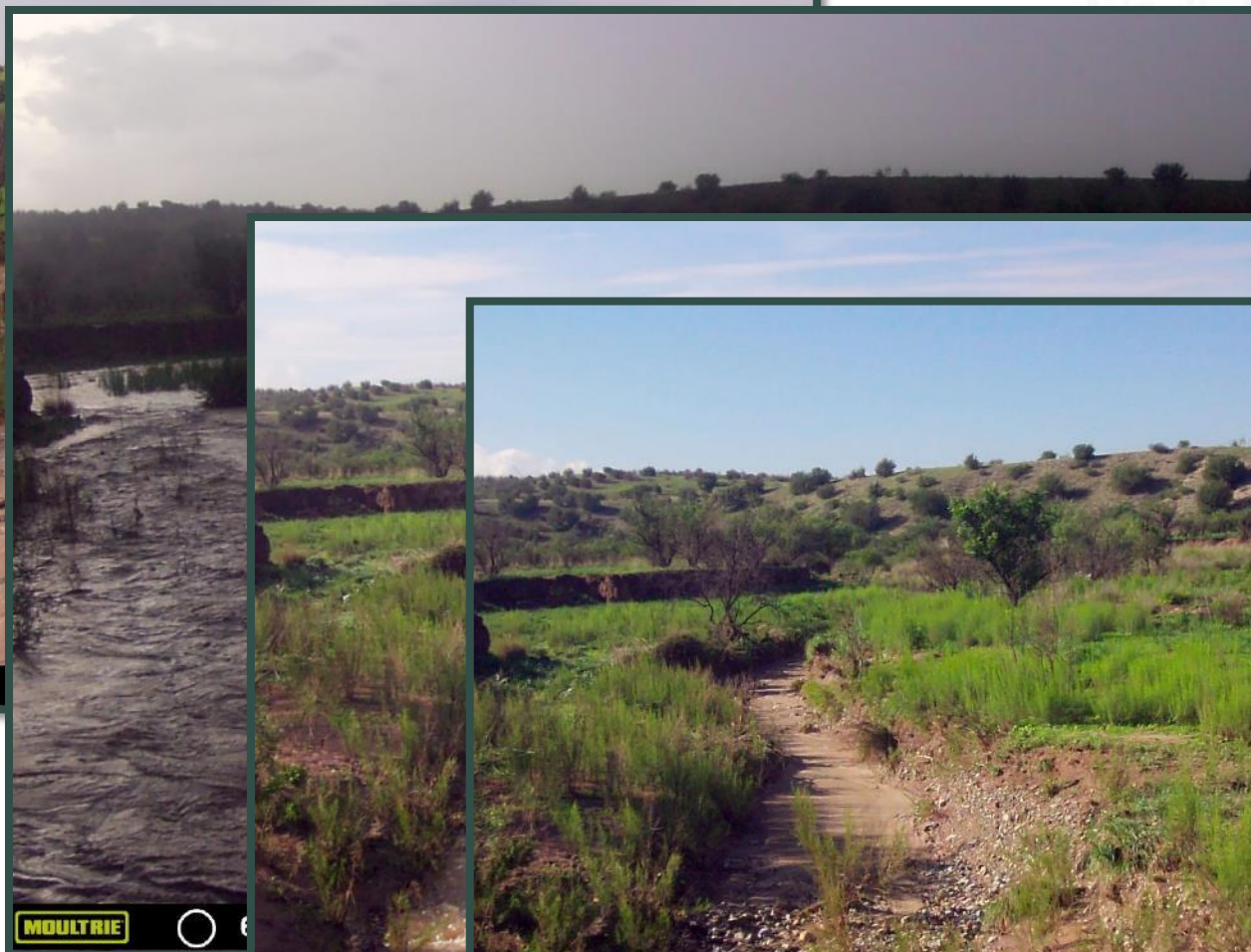
Whitford Canyon- High Flow Example



Big Bug Example- Weather Example



Mattie Canyon- Flash Flood Example

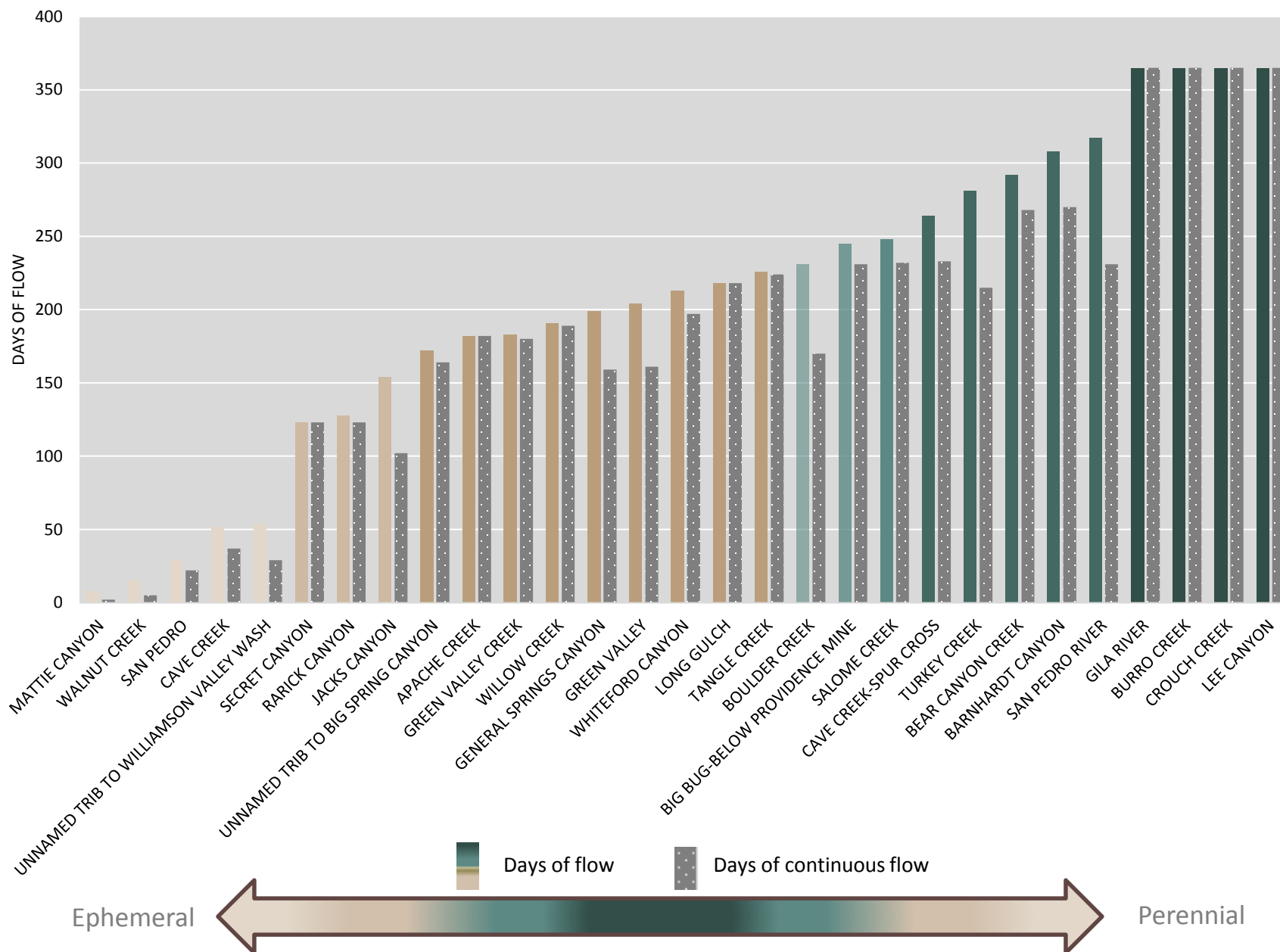


MOULTRIE 77°F

PERSEUS

25 JUL 2017 08:00 am

Intermittent Stream Range of Flow Conditions





MOULTRIE



71°F

MOON UNIT

12 AUG 2016 06:39 pm

MOULTRIE



71°F

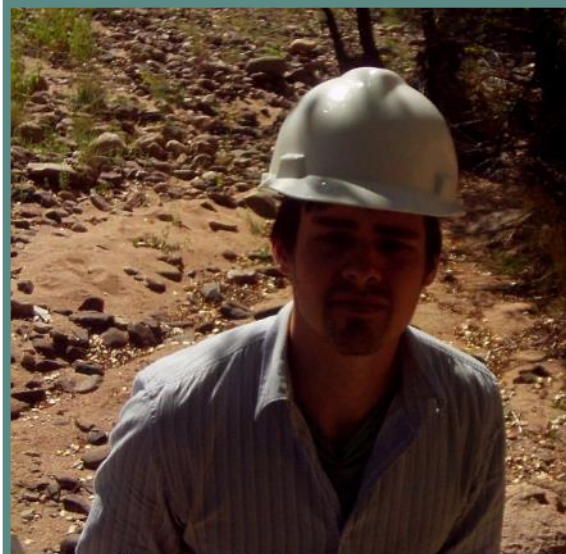
APPLE

12 SEP 2016 12:15 am

8 am

m

Animals of Another Sort



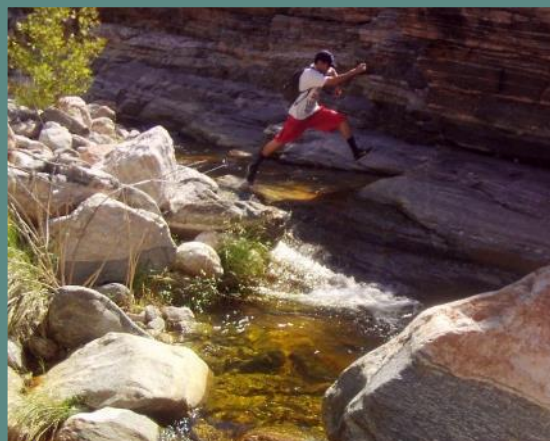
MOULTRIECAM 80°F 11 OCT 2015 12:21 pm



FIFI 84°F 04 OCT 2015 02:06 pm



MADDOX 80°F 09 OCT 2015 11:25 am



FIFI 89°F 13 OCT 2015 11:02



































































































































































































































































































































DWEEZIL 66°F 14 OCT 2015 09:03 am



BLANKET 17 OCT 2015 05:10 pm

Wildlife Infographic

Infographic Representing Wildlife and Human Camera Encounters																
Site ID	# of People  = 20		# Days with Wildlife  = 20													
SRREY001.45	0		6													
LCWIL018.74	2		24	  												
VRUWV001.55	4		47	    												
VRUBS001.35	1		19													
LCJCC045.76	0		49	     												
SRSAL008.74	0		49	     												
SRGVL011.66	1		50	     												
MGWHC003.78	2	 	49	     												
MGLOG000.56	10	         	42	     												
VRAPA002.31	1		21													
MGBGB023.15	2	 	60	         												
SPSPR108.03	0		15													
SRFIN000.78	0		48	         												
SCBCN002.27	617	                                                                                                                                                                                                                                             														

* 2016 data example

Probabilistic Study Statistics



- 29 cameras deployed
- Over 151,000 photos taken
- 73 GB of data collected



- 3 cameras lost to flooding



- 3 cameras lost to fire



- 2 cameras stolen, 1 SD card stolen

Juniper Fire



Mother Nature Won!



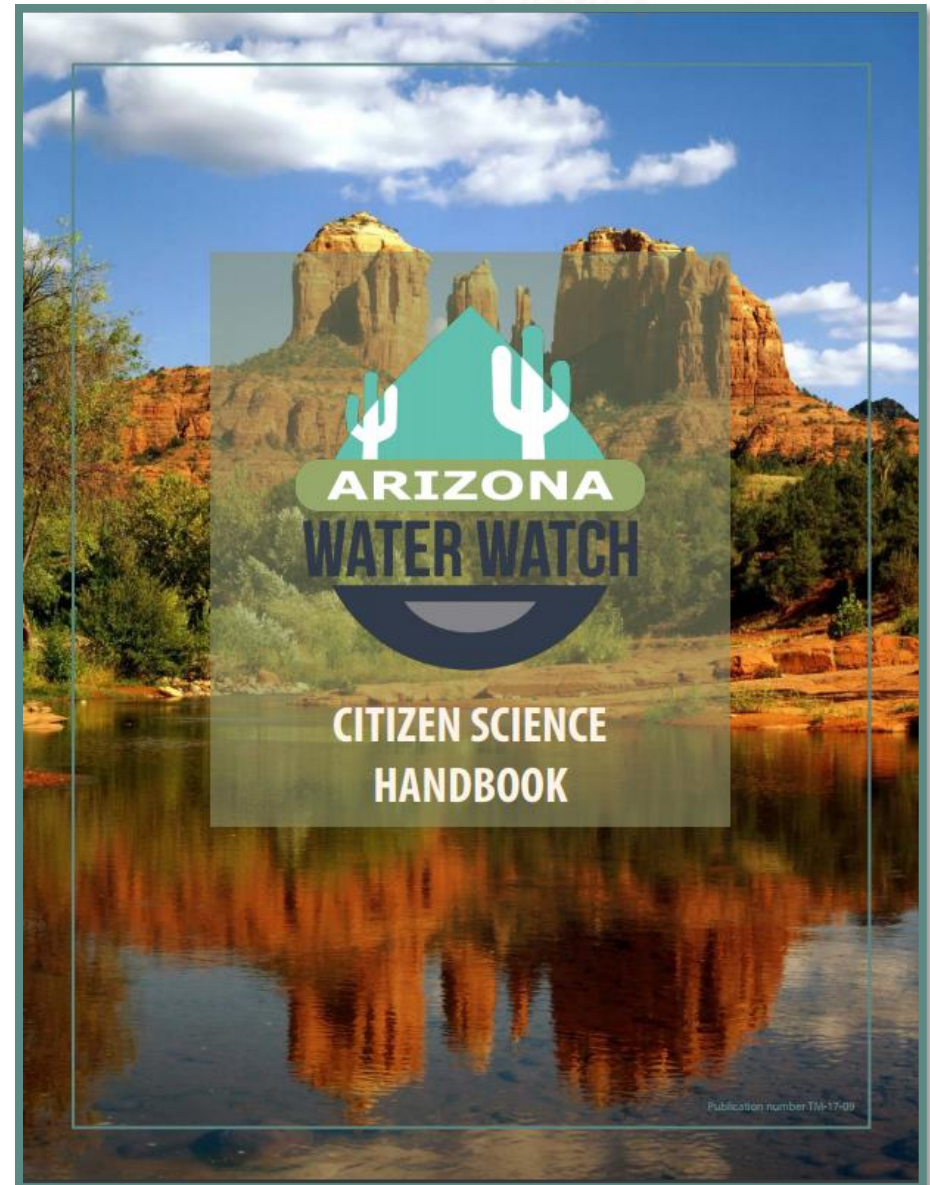
Where Do We Go From Here?



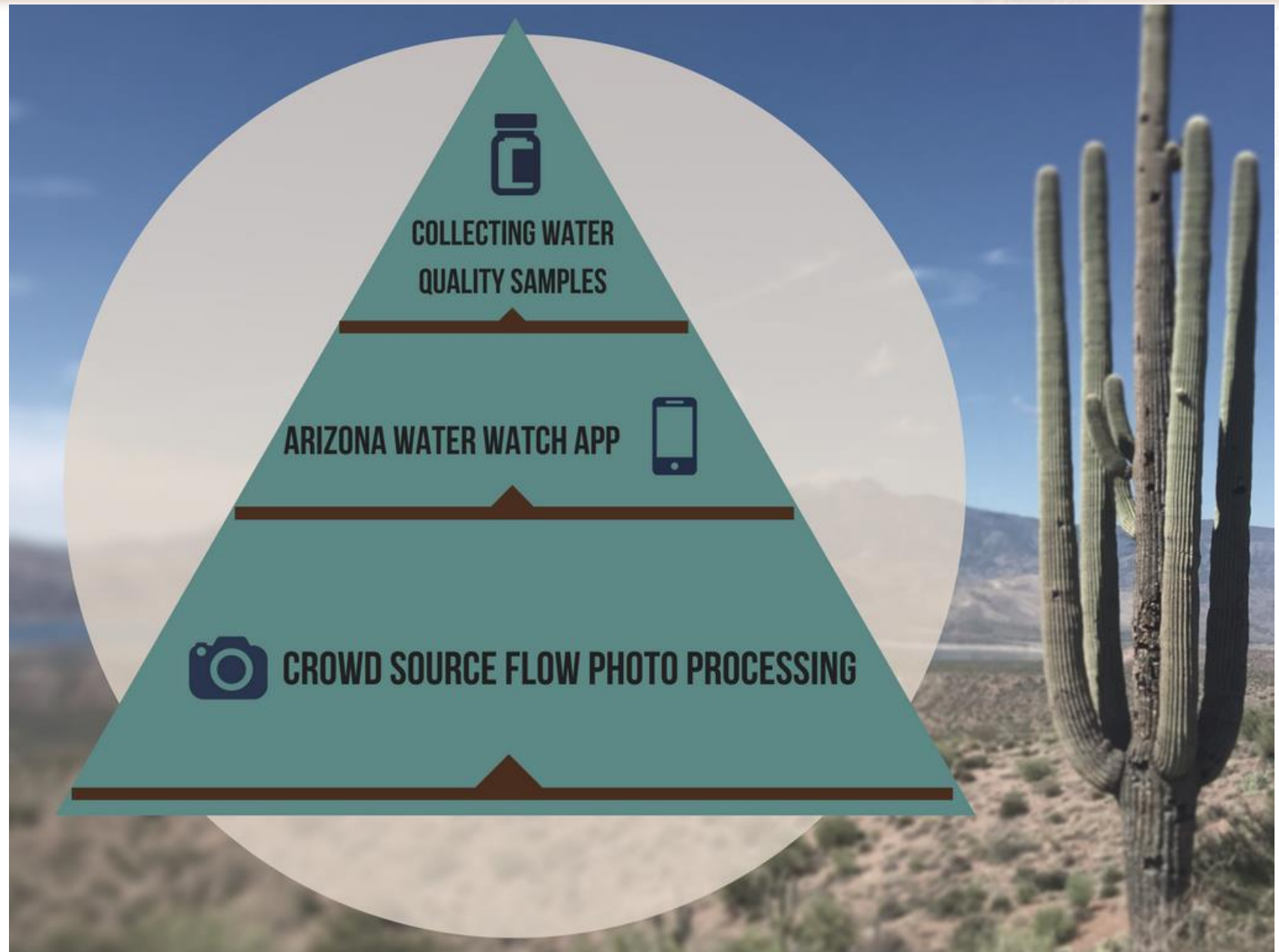
- Assess condition of intermittent streams for the 1st time ever in Arizona using a probabilistic design!
- Classify intermittent streams into flow categories
- Identify stressors
- Update intermittent stream map
- Identify macroinvertebrate community within each flow category.
- Use a targeted and probabilistic study design approach.
- Identify “missed” chemistry samples
- Automate photo processing

Citizen Science!

- 151,000 photos to processes...
- Streams to sample...
- Cameras to maintain...



Multi-Level Volunteer Opportunities



Collecting Water Quality Samples



AWW # _____ (Internal Use Only)

ADEQ CITIZEN SCIENCE DATA FORM

PROJECT NAME: _____ FIELD CREW: _____

SITE NAME: _____ ADEQ SITE ID: _____

____/____/2017 _____ AM _____ PM _____ LATITUDE: _____

_____ LONGITUDE: _____

NAD 83

FIELD DATA: FILL IN THE BLANKS

AIR TEMPERATURE: _____ °C

WATER TEMPERATURE: _____ °C

DISSOLVED OXYGEN: _____ mg/L

_____ %

pH: _____ SU

SPECIFIC CONDUCTIVITY: _____ uS/cm

TOTAL DISSOLVED SOLIDS: _____ mg/L

TURBIDITY _____ NTU

SAMPLE COLLECTION INFO: CIRCLE ALL APPLICABLE INFORMATION IN EACH SECTION

GRAB POLE

LOOKING DOWNSTREAM

LEW---3/4---1/2---1/4---REW

RIFFLE RUN POOL

Samples Collected QC SAMPLE NAME:

E. COLI METALS NUTRIENTS SSC INORGANICS

CIRCLE AND FILL IN APPLICABLE INFORMATION

DILUTION: NONE 1:10 1:100 MEDIA: COLILERT 18 COLILERT 24

COLLECTED INCUBATED COUNTED LRG. WELL SM. WELL MPN

REGULAR: _____ AM _____ AM _____ AM _____

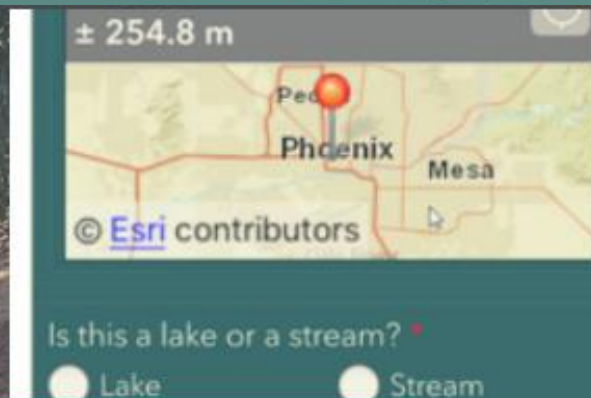
DUPLICATE: _____ AM _____ AM _____ AM _____

DI BLANK: NA _____ AM _____ AM _____

1 of 2



Arizona Water Watch App



Flow Finder: Crowd Sourcing Photo Processing



Help scientists from the comfort of your own home by viewing our intermittent stream camera images and answering questions!

FLOW FINDER: ARIZONA WATER WATCH

ABOUT CLASSIFY TALK COLLECT RECENTS LAB ARIZONA WATER WATCH HOMEPAGE

Flow Observation?

- ☐ Flowing
- ☐ Pooled
- ☒ Dry
- ☐ Not Sure

Back Next

Show the project tutorial

MOULTRIE 73°F PILOT INSPK 15 AUG 2015 01:34 pm

FIELD GUIDE

Time-Lapse Video: Salome Creek July 2015- January 2016



<https://www.youtube.com/watch?v=ISh54A2OrWM>



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Thank you!!!

It takes a group of people to help save the world!

- Monitoring Unit at ADEQ
- Watershed Protection Unit at ADEQ